Gas Well Unloading Time Optimization

NaturalGas EPA POLLUTION PREVENTER

Partner Reported Opportunities (PROs) for Reducing Methane Emissions

PRO Fact Sheet No. 708

Applicable sector(s):

■ Production ☐ Processing ☐ Transmission and Distribution

Partners reporting this PRO: BP

Other related PROs: Install Plunger Lift Systems in Gas Wells, Use Foaming Agents, Install Velocity Tubing Strings

Compressors/Engines	☐
Dehydrators	☐
Pipelines	☐
Pneumatics/Controls	☐
Tanks	☐
Valves	☐
Wells	■
Other	☐

Technology/Practice Overview

Description

Gas flow decreases or ceases as gas wells load up when reservoir fluids build up in the well bore and the well's flow velocity is not sufficient to lift the liquids to the surface against the well's flow line pressure. Options available to the producer are to either shut the well in allowing the bottom hole pressure to increase and then unload the well to the system or blow the well to the atmosphere. For either method, the liquids are removed by increasing the tubing's flow velocity, restoring the well to production. A partner has reported the time to blow down a well to the atmosphere can be optimized, reducing methane emissions and increasing profits.

Methane Savings: 94 MMcf per year (800 wells)

Costs

Capital Costs (including installation)

☐ <$1,000 ■ $1,000 – $10,000 ☐ >$10,000

Operating and Maintenance Costs (annual)

☐ <$100 ☐ $100-$1,000 ■ >$1,000 – $10,000

Payback (Years)

■ 0–1 ☐ 1–3 ☐ 3–10 ☐ >10

Principal Benefits:

Increased profits through the sale of previously vented gas volumes are the primary benefits of optimizing low-pressure gas well unloading times. Reduced methane emissions are an associated benefit of the project.

Reduced emissions and increased profits were realized by determining the minimum time needed to blow down the wells, developing new field protocols, training operators on the new procedures and tracking the results. The time to achieve bottoms-up flow for each set of well flowing conditions (well head pressure, tubing size, gas composition, formation depth, etc.) is calculated by field engineers for each well in the field. In general, this is by formation and depth. Calculated unloading times are verified by shooting fluid levels while unloading a representative well. Charts and procedures are developed for field personnel. Each operator is responsible for tracking and recording well blowdown time. Orifice meters can be installed to establish gas blowdown flow rates for each formation. Savings are determined by comparing before and after unloading periods and their frequency.

Operating Requirements

Operators log current well blowdown times for each well. Engineers calculate average bottoms-up time per well per formation for each set of well configuration parameters. Ten minutes is added to this minimum time to ensure well fluids are unloaded. Verify time period by monitoring casing fluid levels during a blowdown event from a representative well for each formation. Provide field personnel with charts of depth versus blowdown time. Train personnel in the revised procedures. Track actual unloading time to substantiate results.

Applicability
Gas well unloading time optimization is applicable to gas wells that produce some associated liquids and are subject to loading up.

Methane Emission Reductions

Methane is vented to the atmosphere during liquid blow down operations to restore a gas well to production. A partner reduced these emissions by 94 MMcf per year by optimizing well unloading time in two fields with a total of 800 wells.

Economic Analysis

Basis for Costs and Savings
Additional revenue of $282,000 per year was realized based on a venting reduction of 94 MMcf of gas with a nominal value of $3.00 per Mcf.

Discussion
Payout is less than one year. It requires some additional field and engineering time to establish optimum blowdown periods and track results. This time is justified by increased profits, reduced emissions and best practice determination.